Trends in Cognitive Sciences

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Opinion

The pattern theory of compassion

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Concepts of empathy, sympathy and compassion are often confused in a variety of literatures. This article proposes a pattern-theoretic approach to distinguishing compassion from empathy and sympathy. Drawing on psychology, Western philosophy, affective neuroscience, and contemplative science, we clarify the nature of compassion as a specific pattern of dynamically related factors that include physiological, cognitive, and affective processes, relational/intersubjective processes, and motivational/action tendencies. We also show that the dynamic nature of the compassion pattern is reflected in neuroscientific findings, as well as in compassion practice. The pattern theory of compassion allows us to make several clear distinctions between compassion, empathy, and sympathy.

Highlights

This article proposes a pattern theory of compassion on a model similar to a pattern theory of emotion.

This pattern theory of compassion is consistent with cognitive and affective neuroscience studies of compassion.

The pattern theory of compassion facilitates sharp conceptual distinctions among compassion, empathy, and sympathy.

A clear conception of compassion is helpfully relevant to compassion training and the development of compassion-based therapies in mental health and medical contexts.

Empathy, sympathy, and compassion

In philosophical and scientific literatures, one continues to find long-standing equivocations between three closely related but distinct phenomena: **empathy**, **sympathy**, and **compassion** (see Glossary). One problem is that terms such as 'sympathy' and 'empathy' have taken on different meanings since their early uses. Adam Smith, for example, considered sympathy to be a human innate capacity that serves the processes of social and moral relationships, cooperation, and communication. More recently it has come to signify something akin to pity or feeling sad for someone [1]. 'Empathy', a more recent term (originally Titchener's translation of Lipps' [2] term *Einfühlung*), at first meant something resembling an automatic, responsive feeling or resonance towards another person, a meaning still maintained in simulation theories of empathy (e.g., [3]). In contemporary common usage, however, it is not clear that empathy is viewed as automatic. Instead, empathy is viewed as being more selective – a special type of affective state that may depend on understanding the situation of a person.

Our focus in this article is on compassion, and on how to distinguish it from empathy and sympathy. Clarifying the meaning of compassion is relevant because it is increasingly discussed in clinical contexts and contexts concerning psychological well-being. Compassion-focused therapy for mental health problems, for example, attempts to identify interventions that stimulate processes of compassion (e.g., [4,5]). One finds a similar and growing interest in compassion in education, medicine, and other applied contexts (e.g., [6–10]). In these various contexts, however, the concepts of compassion and empathy are not always distinguished [11], although in compassion-focused therapy a distinction is sometimes made, where compassion is considered to be a form of motivation and empathy a competency that may be used for compassionate means [4].

Drawing on psychology, western philosophy, cognitive and affective neurosciences, and contemplative science, we clarify the nature of compassion and its differences from empathy and sympathy by developing the **pattern theory** of compassion. In this approach, compassion consists of a specific set of dynamically related factors that include physiological, cognitive, and affective processes, relational/intersubjective processes, and behavior/action tendencies. We will also show that the dynamic nature of the compassion pattern is reflected in neuroscientific findings, as well as in compassion practice.

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Confusions in scientific, therapeutic, and philosophical contexts

As numerous authors suggest, consistent definitions of empathy, sympathy, and compassion do not exist in the literature; they are often treated as overlapping concepts [12–16]. Acknowledging many different definitions of sympathy and empathy, one paper [17] provides 42 references as evidence of this definitional diversity. Some theorists consider compassion to be a form of empathy (e.g., [18]); others consider empathy to be a form of compassion (e.g., [19]).

In the context of brain-imaging studies, researchers both distinguish between and associate empathy and compassion, equating compassion with sympathy that is understood as a possible outcome of empathy (e.g., [20]). An empathic response to **suffering** is said to involve both empathic distress and compassion. In addition, it has been shown that empathic distress and compassion activate different brain networks that are tied to negative and positive affect, respectively, thereby supporting a distinction between empathy and compassion [20]. Likewise, empathy training is distinguished from compassion training [21]. Although some researchers consider compassion to be a type of emotion [19], and in some cases reference Buddhist conceptions of compassion [20], some Buddhist thinkers [22–24] refuse to equate compassion with a particular emotion. Instead, for them it involves a type of practiced **wisdom** that acknowledges our interdependence with others and the obligation to act to reduce their suffering.

Compassion is increasingly discussed in clinical contexts. In compassion-focused therapy, that is included in the treatment of mental health problems [25], there is a clear distinction between compassion that is understood as a form of motivation, and empathy (or sympathy) that is understood as a skill or competency which can be used for compassionate means [6]. In other discussions of therapist competency, however, compassion is not clearly differentiated from empathy [11].

Cognitive scientists sometimes identify criteria to distinguish empathy from sympathy, as well as from theory of mind and contagion [26]. The central idea here is that empathy is based upon simulation, a process that involves the empathizer entering into emotional states that match those of the person with whom they are empathizing. On this view, when I empathize with someone who is angry, I also experience simulated, vicarious anger. By contrast, when I sympathize with someone my emotional state does not need to be isomorphic with the emotional state of the other. I may feel pity, or worry, or sadness if the other person is upset, for example. On the one hand, this difference may differentiate empathy and compassion if one equates compassion and sympathy [20]. On the other hand, the Buddhist requirement that compassion involves motivation for prosocial behavior may distinguish it from both empathy and sympathy [22–24].

This short review may be sufficient to indicate the serious conceptual confusions that exist in the literature. We offer some conceptual clarifications by taking a pattern-theoretic approach to distinguishing between empathy, sympathy, and compassion. In the next section we explain the concept of a pattern theory by focusing on emotion as a starting point. We then present the pattern theory of compassion and the related neuroscience. This will allow us to distinguish the compassion pattern from the patterns of empathy and sympathy.

The pattern theory of emotion

The pattern theory of emotion claims that emotions are complex patterns of bodily/physiological processes, experiences, expressions, and actions, which together make up an emotion pattern. As such, emotions are individuated by patterns of characteristic features [27–29]. This idea was developed under the title 'differential emotions theory' [27] which contends that a complex emotion consists of a pattern of more basic emotions. On a different and more dynamic conception, emotions are considered as patterns of variables that are not themselves emotions [29]. We can

Glossary

Cognitive appraisal: cognitive evaluation and interpretation of a phenomenon or event such as an emotional situation.
Compassion: an action-motivating form of feeling or caring attitude directed towards alleviating the suffering of another person, supported by emotion regulation and cognitive processes.
Compassion meditation: the cultivation of an emotional attitude aimed at fostering compassion toward oneself and others.
Emotion regulation: attempts to monitor and modulate one's emotional experience through strategies.
Empathy: an affective state isomorphic with the positive or negative affective state of another person that is elicited by observing or imagining the other person, and when one knows that the other person is the source of one's own affective state.
Equanimity: an even-minded mental attitude or dispositional tendency toward all experiences, objects, or persons (living beings) regardless of their origin, attributes, or the implicated affective valence.
Intentional object: the target of any cognitive act, such as perception, memory, or imagination.
Mindfulness: non-judgmental or acceptance-based attentional awareness of experience at the present moment.
Pattern theory: the view that a particular phenomenon (e.g., an emotion) is a pattern of dynamically related diverse factors or processes.
Phenomenal feeling: the qualitative feel of experiencing, typically construed as 'what it is like' to experience something.
Suffering: a severely unpleasant experience of a psychophysical or existential type that may include but is not reducible to physical pain.
Sympathy: a caring affective state intentionally directed towards the negative experience of another person.
Wisdom: general knowledge in life management, life planning, and life review, including an ethically grounded capacity for social-cognitive reflection and perspective taking, with an orientation toward the common good and pursuing a deeper truth.

think of such variables, such as neurohormonal, motoric, and experiential processes set up as evolutionary adaptations, as being interactively related such that emotions are constituted as dynamic interactions of such constituents, including organism–environment transactions. We can think of discrete emotions as being dynamically self-organizing in that 'recursive interactions among component processes generate emergent properties' ([28], p. 15). Thus, different emotions are constituted by different patterns of processes which yield behaviors that vary from one individual to another, and within individuals over time – where such behaviors/expressions are components of the emotion. Individual emotions may still combine or coassemble with other emotions to form new emotion patterns that may stabilize over repeated occurrences.

On this approach, one can provide a catalog of different features which may contribute to specific patterns that constitute emotions [29]. These include the following.

(i) Physiological processes: for any emotion, autonomic activity is a possible constituent, and the subject may be aware of autonomic effects or not. Not every emotion has a distinct autonomous nervous system (ANS) pattern, and different emotions do not necessarily have different ANS patterns [30].
(ii) Actions or action tendencies: these are bodily changes in preparation for actions that may be experienced as urges to perform a particular type of action [31]. Some emotions, for example happiness, may or may not include this component; others may be typically associated with specific actions (e.g., freezing, fighting, or fleeing in fear).
(iii) Overt expressions: these include expressive postures and movements, facial expressions, gestures, and vocal expressions and intonations.
(iv) **Phenomenal feeling**: the conscious phenomenal feeling component is often part of an emotion, although it is not necessary for every emotional occurrence. In some rare cases, typical physiological, expressive, and cognitive aspects may be present without the phenomenal aspect (e.g., in subjects who are disposed to repress fear [32]).
(v) Cognitive processes: these include typical emotion-related attitudes, shifts of attention, and perceptual changes. Cognitive attitudes may include, for example, belittling thoughts about one's rival in the case of jealousy, or a judgment that one has been treated unfairly in some cases of anger [29].
(vi) **Intentional objects**: an intentional object is the perceived, remembered, or imagined object that the emotion is about [33]. One can distinguish between self and other orientations: some emotions are focused on self-related processes, whereas others involve intersubjective relations.

These features are variables that can take different values and weights in the dynamic constitution of an emotion. Some values are more or less likely to occur together. In this respect we can distinguish a typical pattern of affective aspects and values and define an emotion as involving some set of variations of that pattern. To say that a particular feature is constitutive of an emotion does not mean that it is an essential component [29]. Although there may be some minimal number of characteristic features and their values which is sufficient to constitute a particular pattern that counts as instantiating a particular emotion type (e.g., anger), the same type of emotion can lack a particular characteristic feature. Not all instances of anger, for example, involve aggressive action tendencies or narrowed attention. One or more factors may be missing, but there may still be a sufficient number and organization of factors to allow the pattern to be recognized as anger.

The idea that emotion can be understood as a pattern of this type is consistent with enactivist conceptions of emotion 'forms' that involve various neural, muscular, and autonomic processes that together form an integrated pattern ([34], p. 69). A pattern exists not only as a collection of

factors but also, importantly, as a set of relations among these elements. The specific value and weight that each element has in the pattern will depend on its relations with other elements. We can think of the pattern as a dynamic gestalt in which, if one factor (or value or weight relative to the whole) is changed above a particular threshold, some or all of the other factors (and perhaps the whole) adjust. In a dynamic gestalt, what happens with respect to one factor is determined by what happens with respect to all the others [35].

The pattern theory of compassion

Several psychologists define compassion as a unique emotion [19,36]. On this view, one should be able to map out an emotion pattern that defines compassion. To be clear, however, we take compassion to be (like emotion) a pattern of different factors that include not only affective components but also other features that are not necessarily the same components as those of an emotion pattern. Accordingly, we understand the pattern theory of emotion to be a useful heuristic for developing a pattern theory of compassion, one that allows us to characterize compassion without necessarily equating compassion with an emotion.

We can start our considerations with a consensus list of components or characteristics derived from several reviews [36,37]. Compassion involves (i) recognition or awareness of suffering, (ii) feeling 'moved' for those who are suffering, (iii) appraisals of the situation of the other person and one's own ability to respond and tolerate distress, (iv) being motivated to act, or acting to alleviate the suffering, and (v) activation of neural systems that drive such motivations and actions.

We propose that these components can be incorporated into a more comprehensive pattern of processes and factors that constitute compassion, consistent with the view expressed by Goetz and Simon-Thomas: 'Although we see compassion as involving a patterned and specific response, we do not see the components listed here as serial, or occurring in temporal sequence. We also do not consider the processes underlying these components to be wholly independent; they probably overlap and occur in parallel, and exert bidirectional influence upon one another in different configurations throughout life' ([37], pp. 27–28). Like emotion, we can define compassion as a particular recursive gestalt arrangement of processes. Mapping out this compassion pattern will allow us to clearly differentiate it from empathy and sympathy.

The compassion pattern includes the following factors/processes drawn from scientific, Western philosophical, and Buddhist psychology sources. As in the case of an emotion pattern, not all factors are necessarily present in all forms of compassion. Moreover, although various theories may claim that one or more of these factors is central or essential to compassion, the pattern theory can leave this an open question and still offer some clarification about the nature of compassion. What is central to the compassion theory is that some set of factors/processes and their dynamic relations form a particular recursive arrangement of processes that constitute the compassion pattern.

Physiological processes

Compassion modulates the hormones oxytocin and vasopressin, processes of the parasympathetic nervous system, and other neurophysiological circuits [16,38,39]. Autonomic/parasympathetic processes leading to heart rate deceleration can be associated with compassion [19].

Action tendency/motivation

Compassion involves the altruistic motivation to act to alleviate suffering [3,19,40]. This motivation may be reactive to the experience of the suffering of another person or may be proactively attuned to improve the lives of others. This prosocial aspect is consistent with neuroscientific evidence [16,41].

Overt expressions

Typical (although not unique) bodily expressions – facial expressions, posture, vocalizations, and tactile behavior – may characterize instances of compassion [19].

Affective/phenomenal feeling

Feeling 'moved' for those who are suffering, variously described as an experienced emotional resonance or involuntary arousal (which may be due to activation of the ANS [19]). Compassion may reflect feelings that are both positive (related to social accomplishment, caregiving) and negative (about the other's suffering) [37].

Cognitive processes

Compassion involves processes of **cognitive appraisal** that are attuned to antecedent signs of undeserved suffering, as well as to one's physical and emotional capacity to address it [19]. This depends on an ability to attune to and cope with the distress associated with witnessing the suffering of others [16]. At a dispositional level, this is not merely an intellectual understanding of our interdependence [23,42] but is also a wisdom that informs practice [42,43]. Contemplative traditions identify a variety of cognitive processes involved in compassion practice, including attentional, constructive, and deconstructive strategies that involve meta-awareness, perspective taking, cognitive reappraisal, and self-inquiry [42] (Box 1).

Intentional object

Compassion specifically targets the suffering of another person [4]. Compassion is not the generic sharing of the emotions of another; instead it implicates a feeling of caring about and being moved by the suffering of another [36]. Sometimes, however, compassion may not have an intentional object [22,23].

Self/intersubjective orientation

Compassion involves a relational attitude that extends beyond the self to others without being affected by qualities such as emotional closeness, trust, or kinship. Compassion allows for relationships beyond kin relationships: it can apply to out-group members [19]. In Buddhist practice, compassion applies equanimously to everyone [22,44].

Situational aspects

Specific situational aspects or antecedents of compassion may include the presence of others (including infants or children, as well as animals) in need, distress vocalizations, pain, sadness, illness, physical or mental disability, homelessness, poverty, and natural disasters [19].

Emotion regulation processes

Compassion requires a reflective and **emotion regulation** competency that maintains a mental balance [45] which is capable of steering a course between avoidance of pain, suffering [46,47], and emotional reactivity involving empathic distress [20]. This type of regulation can be achieved by **mindfulness** training aimed at cultivating non-judgmental or acceptance-based attention to experience at the present moment [46–48].

The processes involved in the compassion pattern are dynamically intertwined, enacted in a holistic fashion, and should not be thought of as being simply an additive list or following a stepwise serial or sequential order [37]. Nevertheless, for heuristic purposes one could map out the set of elements/processes that are involved in the practice of compassion in a multifaceted cycle (Box 1).

Neuroscientific findings related to the compassion pattern

Compassion has received increased attention in neuroscientific studies in recent years [19,49,50]. One can find data suggesting physiological and neurophysiological correlations that reflect many of the specific factors and their dynamic interactions in the compassion pattern and the cycle proposed in Box 1 (Table 1).

A recent meta-analysis of 16 fMRI studies [49] confirms compassion-related activation across seven broad regions, where the largest peaks are localized to the periaqueductal gray, anterior insula, anterior cingulate cortex (ACC), and inferior frontal gyrus. An integrative review [50] revealed that the most frequent associations with compassion across all the studies analyzed are found in the orbital part of the left inferior frontal gyrus, right cerebellum, bilateral middle temporal gyrus, bilateral insula, and right caudate nucleus. A lower degree of compassion tends to be associated with either lower neural activity or gray matter volume in neural areas linked to reward, and is thus related to the motivation or action tendency processes of the compassion pattern.

Box 1. The compassion cycle

We can picture a compassion cycle that includes the recurring aspects listed below (Figure I).

1. An underlying dispositional attitude (which may include wisdom as the result of prior compassion experiences or compassion training) and related cognition/metacognition based on insights about the nature of the self, the other, and interdependence.
2. An underlying dispositional motivation to (equanimously) care about and alleviate the suffering of others.
3. Recognition of the pain and suffering of others (intentional object).
4. Empathic negatively valenced phenomenal feeling of pain/suffering.
5. Rapidly established emotion regulation (e.g., based on mindfulness and equanimity) processes that prevent the pain avoidance drive and reactivity, leading to emotional contagion or empathic distress.
6. Cognitive appraisal of the suffering, its context, and the available resources to help, possibly also involving perspective taking and further emotion regulation based on cognitive reappraisal.
7. A caring drive with a positively valenced phenomenal feeling of warmth and feeling 'moved' to alleviate suffering.
8. Context-sensitive intention formation toward an appropriate compassionate response.
9. Conscious selection and enaction of an appropriate response.
10. Appraisal of the enacted response consequences.
11. A cognitive monitoring and learning process that links the recognition of the pain/suffering stimulus and the awareness of the situation/context with the enacted response and its consequences, which inform cognitive and emotional dispositions towards further encounters with pain/suffering stimuli.

This cycle includes a functional recurring arrangement of dispositional aspects, perceptions, feelings, cognitive processes, actions, monitoring, and learning processes. We can ask whether these are discrete states or traits, or are instead more relational or fluid processes [4]. Likewise, we can ask whether, in each case, every step is necessary – something that is not required by the pattern theory (see Outstanding questions).

This pattern-theoretic compassion cycle is relevant to training for compassion in contemplative, clinical, and educational contexts. The putatively synergistic involvement of such processes in compassion training may underlie its holistic effectiveness in improving psychological well-being, including stress-related immune response (e.g., [67,68]), mental and physical health (e.g., [67,69]), positive affect (e.g., [69]), empathic responses towards others (e.g., [70,71]), positive emotions towards those who are suffering (e.g., [72,73]), prosocial behavior (e.g., [74,75]), cognitive reappraisal as an emotion regulation strategy [76], emotional memory retrieval [77], and the reduction of interpersonal conflict [78].

Concerning compassion training in contemplative practices, the pattern theory of compassion highlights the importance of integrating the training of (i) attention, mindfulness, equanimity, and related emotion regulation skills, (ii) the 'constructive' strengthening of psychological patterns that foster a caring motivation and a sense of interconnectedness with others, as well as positive emotions and well-being, and (iii) the 'deconstructive' undoing of maladaptive cognitive patterns and habits by exploring the dynamics of perception, emotion, and cognition to generate insights into one's understanding of self, others, and the world [42]. Accordingly, the contemplative traditions identify cognitive processes that involve meta-awareness, namely a heightened awareness of one's own thinking, feeling, and perceiving, as well as perspective taking – understanding another's situation and how they feel, cognitive reappraisal, and self-inquiry [42].

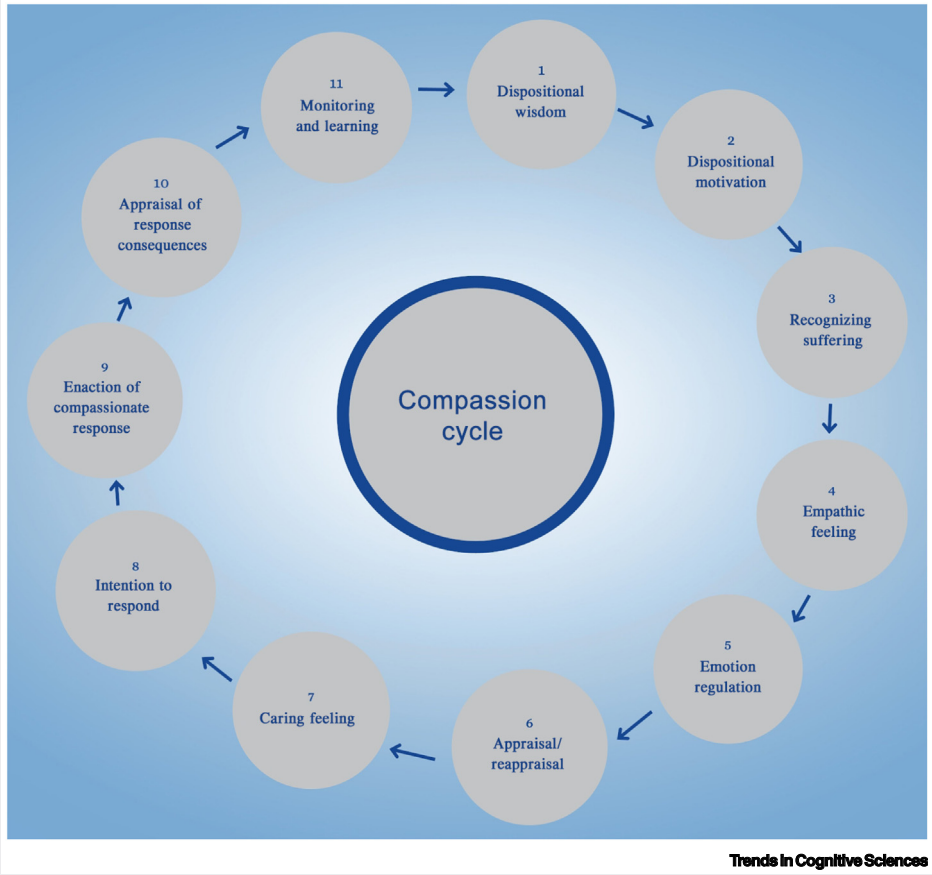

Figure I. The compassion cycle. A possible ordering of elements and dynamic processes in the compassion pattern in a multifaceted cycle in compassion practice.

Table 1. Compassion and neural activations: associations between compassion processes, brain region activations, and factors of the compassion pattern derived from [19]

Compassion process	Brain region activations	Factor of the compassion pattern
Detecting the expressions of suffering of another person	Temporoparietal junction	Intentional object
Mirroring the emotional experience of another person	Inferior frontal cortex, insula, temporal pole	Intersubjective orientation
Assessing the relevance/deservedness of the sufferer	Mid-ventral medial prefrontal cortex	Cognitive processes
Coping with empathic distress	Dorsal medial prefrontal cortex/inferior frontal cortex	Emotion regulation
Feeling warmth/tenderness towards others	Periacqueductal gray, substantia nigra, and ventral tegmental area	Phenomenal feeling
Overarching motivation to approach	Heightened left hemisphere activation	Action tendency/ motivational aspect

Several neuroscientific studies highlight the involvement of the ACC and anterior insula in compassion. According to an influential model [51], the anterior insula and ACC have a close functional relationship: they may be considered together as the input (anterior insula) and output (ACC) regions of a functional system that is engaged across cognitive, affective, and behavioral contexts, and that interplays with autonomic processes. One possible hypothesis is that the anterior insula plays a key role in the sensory and phenomenal feeling aspects of the compassion pattern, and the ACC in the motivational action-related aspect. Given their interplay with the ANS (and thus with hormonal regulation), the limbic network, and other executive control regions in prefrontal cortex, as well as their role in modulating interactions between core brain networks implicated in cognition, emotion, and interpersonal processing [52], the anterior insula and ACC may serve as crucial brain hubs for compassion. Moreover, motivational action-related processes in the compassion pattern may involve midbrain periaqueductal gray [53], a phylogenetically old area that supports mother–infant attachment behaviors and is plausibly implicated in a caregiving orientation towards those who are vulnerable or suffering, thus motivating compassionate responses.

The interplay with hormones (i.e., oxytocin, estrogens, prolactin, and vasopressin) reflects a dynamic linking with other core physiological processes of the compassion pattern. The overall process is highly complex if one considers that each hormone may exert different roles in different circumstances. For example, it has been demonstrated that the increase of plasma oxytocin levels contingent upon acute psychosocial stress is buffered by affective and perspective mental training. Crucially, however, stress-contingent oxytocin levels increase after a short-term compassion-related loving/kindness/meditation session [54]. In keeping with the allostatic theory of oxytocin [55], this pattern of results indicates that one important function of oxytocin may be that of maintaining stability in ever-changing environments. It is also worth mentioning that neuropharmacological and neuroimaging research [49] highlights the combined influence of neural and hormonal influence on compassionate behavior.

Given the proposal that the multiple processes or aspects of the compassion pattern are interdependently related in a dynamic gestalt, it is important to explore the integration processes that are reflected in neural mechanisms. A putative mechanism may involve large-scale oscillatory synchronization in the brain, as observed in the gamma band in long-term **compassion meditation** practitioners [56]. Dynamic complexity measures, such as causal density and information integration, may also be relevant to reveal the integrative neural processes that are implicated in the compassion pattern, including relevant phenomenal feelings [57] (Box 2).

Revisiting the distinctions between compassion, empathy, and sympathy

The pattern theory of compassion puts us in a better position to discuss how compassion relates to empathy and sympathy. One strategy would be to provide a pattern theory of empathy and sympathy, and then perform a comparative analysis. Given that there are extensive philosophical issues involved in this type of analysis, and given the space limitations of a journal article, in place of the longer and more complex analysis we propose a shortcut. Simulationist accounts of empathy propose a clear distinction between empathy and sympathy, and identify five conditions that define empathy [26,58,59]. We take this as a good starting point for an analysis that will distinguish the pattern of compassion from those of both empathy and sympathy.

The simulationist account offers the following definition in terms of a set of collectively sufficient conditions for empathy [26]. There is empathy if (i) one is in an affective state, (ii) this state is isomorphic to the state of another person, (iii) this state is elicited by the observation or imagination of the affective state of another person, and (iv) one knows that the other person is the source of one's own affective state ([26], p. 435). The first 'affectivity' condition distinguishes empathy

Box 2. How to empirically test the pattern theory of compassion

A variety of specific research targets and innovative methods in the study of the processes of compassion and its neural correlates, that combine dispositional self-report measures, neuroscientific investigations, behavioral tasks, phenomenological reports, and experience sampling methods, can enhance our understanding of compassion as well as the ecological validity, precision, and discriminant validity of compassion measures. Accordingly, the pattern theory of compassion can be empirically tested using the following research methods.

(i) Studying the relationships between dispositional (trait) self-report measures of compassion pattern factors (such as through scales measuring empathic feeling, sympathetic concern, and perspective taking; e.g., [79,80]), prosocial motivation and altruistic behavior (e.g., [81,82]), equanimity (e.g., [83]), cognitive reappraisal [84], wisdom [85], and mindfulness facets (e.g., [86]) by both meditation-naive and meditation practitioners with different types of expertise. Positive correlations between trait compassion pattern factors and self-reassurance [87], as well as negative correlations with self-criticism [88] and pain catastrophizing [89], can be further assessed.
(ii) The use of focused induction procedures [90–92] to assess causal influences [46] between compassion pattern states, including compassion-related physiological states.
(iii) The use of modular mental training programs, with modules focused on different aspects of the compassion pattern, to longitudinally assess influences between measures of multiple factors in the compassion pattern.
(iv) The use of ecological experience sampling [93] to assess relationships between states associated with different aspects of the compassion pattern, also in association with dispositional self-report measures.
(v) The use of functional neuroimaging to assess the implications of brain regions and networks in association with the induction of different aspects of the compassion pattern, with particular reference to anterior insula and anterior cingulate cortex (ACC, main text). Brain functional connectivity, including patterns of causal influences, can be usefully assessed.
(vi) The use of event-related potentials [94], in combination with subjective reports (e.g., [46]) related to different aspects of the compassion pattern, to assess the temporal ordering and causal influences of aspects of the compassion cycle, in response to stimuli about the suffering of others, also in association with dispositional measures and in longitudinal designs with mental training.

from standard mindreading, whether based on theoretical inference or simulation routines, because inferring that another person is in pain, for instance, can be distinguished from experiencing or feeling empathetic pain [59]. The second 'interpersonal similarity condition' ([59], p. 521) distinguishes empathy from sympathy: empathy involves being in the same affective state as the other person (I feel your pain), whereas sympathy involves being in a different, although valence-congruent, affective state (e.g., I feel sorry that you are in pain).

To capture the idea that empathy is other-directed, one can add a fifth condition: the caring condition [58]. In the case of empathy, one cares about the affective life of the target. However, even if empathy is other-directed, is not clear that the caring condition is essential because it is also thought that someone who is a good torturer may use an empathic sense to know the state of his victim, without caring for that person. On a different view [60], the caring condition operates as a mark of sympathy rather than empathy, and this marks the difference between the two types of state: sympathy involves concern or caring for the other person, whereas no such concern is essential to empathy. The conditions defining empathy suggest that empathy involves a specific pattern of processes that overlap in some regards with compassion and sympathy, but differ in some regards. Both empathy and sympathy involve, or are, emotional/affective states, although empathy (understood as cognitive empathy) can sometimes be more of an intellectual attitude. Empathy, in contrast to both sympathy and compassion, requires not only a relevant affective state in the empathizer, but this state, which can range across a broad set of affective conditions, from joy to fear, to anger, to pleasure, must match that of the target. The intentional object of compassion, however, is specified as the suffering of the other person, and compassion is not itself a form of suffering and in fact is a counterpoint attitude to suffering. Compassion, like sympathy, involves a caring attitude which is not essential for empathy. An important difference between compassion and sympathy, however, is that – even if sympathy does involve a caring attitude – such caring does not necessarily lead to action designed to alleviate suffering, whereas compassion involves motivation to engage in exactly such an action.

There are three further issues to consider. First, researchers suggest that empathy may lead to empathic distress resulting in a negative feeling or stress, burnout, or poor health, and thence to withdrawal and non-social behavior [20]. This type of effect would involve a different kind of normative attitude (as well as differences in affectivity and bodily processes) and could undermine a positive caring attitude. Second, concerning the type of intersubjectivity involved, one can cite what is sometimes regarded as the dark side of empathy, namely that it tends to be discriminatory, such that it fails for out-groups as much as it succeeds for in-group members. **Equanimity** is often not a characteristic of empathy, which may not exist for out-groups or competitor groups [4,61–65]. These are complications that clearly distinguish empathy from compassion because the latter is characterized by equanimity. Finally, we note that, like other facets of intersubjectivity, compassion is influenced by cultural factors such as the degree of social interdependence. It has been hypothesized that negative social affect has a major influence on the conception, experience,

Table 2. Distinctions between compassion, empathy, and sympathy: contrasts between compassion, empathy, and sympathy with reference to the pattern theory of compassion

	Compassion	Empathy	Sympathy
Self/intersubjective orientation	Equanimity: relational, intersubjective aspects that extend to out-groups, or 'universally', without discrimination	Discriminatory: it can fail for out-groups as much as it succeeds for in-group members	Like empathy, discriminatory
Intentional object	Specifically targets the suffering of another person	Sharing/matching of the emotional state (e.g., fear, anger, happiness) of another person; interpersonal similarity condition	Variable targeting of the emotional states of another person; no interpersonal similarity condition
Situational aspects	Specific situational antecedents that define or indicate suffering	Various situations involving positive or negative affect	Various situations involving negative affect that elicit a caring attitude
Cognitive processes	Cognitive appraisal processes attuned to undeserved suffering, and to one's capacity to address it, including a reflective ability to attune to and cope with the distress associated with witnessing the suffering of others; this may involve a wisdom-informed practice with insights leading to realization that we are interdependent with others	Processes involving imagination to form 'as if' or pretense state that matches the state of the other; this may involve simulation or inference of the mental state of another person	Appraisal processes attuned to the negative situation of another person
Emotion regulation processes	A reflective and emotion regulation competency that maintains an emotional and mental balance capable of steering a course between avoidance of pain and suffering and emotional reactivity leading to empathic distress	May involve distress and may be strategically used to cause distress in others	Typically not distressful, and in this respect there is no need for emotion regulation
Action tendency/motivation	Altruistic motivation to act to alleviate suffering as an essential part; a prosocial behavioral attitude	No motivation to act towards the other or their situation; possible withdrawal and non-social behavior in the case of empathic distress	Motivation to act towards the other or their situation is not necessarily involved
Physiological processes	Modulates the hormones oxytocin and vasopressin, and processes of the parasympathetic nervous system (e.g., the vagus nerve), as well as different neurophysiological circuits	Increased heart rate; possible activation of mirror system, including superior/middle temporal sulcus/gyrus, and the anterior insula, as well as more cognitive areas: the medial prefrontal cortex, the temporoparietal junction, the superior temporal sulcus, and the anterior temporal pole	Contrasting with empathic distress, lower heart rate
Affective/phenomenal feeling	Emotional resonance; both positive (associated with care-giving and prosocial action) and negative feelings (associated with the suffering of another person)	Emotional/affective resonance	Emotional/affective resonance plus concern
Overt expressions	Typical (although not unique) bodily expressions: facial expressions, posture, vocalizations, tactile behavior	Similar	Similar; contrasting with empathic distress, increased facial responses

and expression of different facets of intersubjectivity [66]. However, a comprehensive model of the cultural shaping of compassion is still lacking, and further research on this topic is needed.

The similarities and distinctions between compassion, empathy, and sympathy in light of the pattern theory of compassion are summarized in Table 2.

Concluding remarks

Our focus in this paper has been on compassion. Using a pattern-theoretic approach we distinguish compassion from empathy and sympathy. Drawing on psychology, Western philosophy, affective neuroscience, and contemplative science, we have offered some clarification about the nature of compassion, and show how neuroscientific studies support the notion of a compassion pattern, and how the dynamic nature of the compassion pattern is reflected in practice.

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Declaration of interests

The authors declare no conflicts of interests.

Outstanding questions

Does compassion involve discrete states, or traits, or are rather more relational or fluid processes implicated? Are all discrete states or relational/fluid processes in the compassion pattern implicated in compassion practice?

How do the patterns of empathy and sympathy overlap with the factors and processes of the compassion pattern?

How can the compassion pattern be measured? What trait and state self-report scales can be developed for such purpose? How can the interdependence of the aspects of the compassion pattern be assessed?

How do self-compassion and compassion for others interact in compassion practice and compassion training?

What are the effects of an equanimous stance toward intentional objects of compassion on other aspects and processes of the compassion pattern?

How do compassion meditation and mindfulness meditation practices interact to support the training of compassion? How do meditative insights about the self and social interdependence support compassion training?

How are the dynamical brain–body–environment processes of the compassion pattern integrated and how do they correlate with neural activity? Do large-scale oscillatory synchronization in the brain play a role for the integration of such processes? Can causal density and information integration measures be successfully applied to the compassion pattern? Do anterior insula and anterior cingulate cortex together play the role of a core hub or an orchestrating role in the brain for the compassion pattern? How do they interact with each other? How do they relate to reward circuits, the autonomic nervous system, and hormonal modulation? Is the anterior insula primarily implicated in the empathy pattern, and anterior cingulate cortex in the sympathy pattern?

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